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Predictors of Having Paid Work in Older Workers With and Without Chronic Disease: A 3-Year Prospective Cohort Study

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Abstract *Background* As the prevalence of chronic disease amongst older workers is high and increasing, it is important to know if the large subgroup of older workers with chronic disease has specific needs when it comes to prolonging participation in paid work. *Objectives* To investigate differences and similarities in predictors of having paid work in workers aged 55+ with and without chronic disease. *Methods* Workers aged 55–62 years were selected from the 2002–2003 cohort of the Longitudinal Aging Study Amsterdam (n = 333). Potential predictors were: health, personality, work characteristics, and demographics. Per potential predictor, a logistic regression coefficient for 'having paid work in 2005–2006' was calculated for workers with and without chronic disease. A pooled estimate was computed and differences between the pooled estimate and the coefficients were tested. *Results* Follow-up data were available for 95 %, of whom 67 % still had paid work. Predictors of having paid work were similar for workers with and without chronic diseases, except for physical workload ($\chi^2 = 5.37$; DF = 1) and psychosocial resources at work ($\chi^2 = 5.94$; DF = 1). Having more psychosocial resources (OR = 3.57; 95 %CI 1.33–10.0) was predictive for having paid work in workers with chronic disease and not in workers without chronic disease. Lower age, more weekly working hours, no functional limitations, fewer depressive symptoms, lower neuroticism scores, and more sense of mastery were significantly associated with having paid work in all workers. *Conclusions* Differences between predictors of having paid work between workers with and without chronic disease should be taken into account when aiming to prevent exit from the workforce. In particular the vulnerable subgroup of older workers with chronic disease and low psychosocial resources at work is more likely to quit working.

Keywords Longitudinal studies · Aging · Employment · Chronic disease · Social participation · Retirement

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Introduction

The average life expectancy of the population is rising in most Western countries, which suggests that longer working is possible. With the proposed increases in the legal retirement age in several European countries, the average age in the working population will increase as there will be relatively more older employees active in the workforce compared to the decreasing number of young workers

entering the workforce. It becomes increasingly important to prolong participation in the workforce of older workers as they represent a large and increasing proportion of the working population.

There is, however, a second consequence of ageing of the working population. The prevalence of chronic diseases increases with age, implying that in particular older workers are more likely to suffer from chronic disease, as well as from comorbidity and multimorbidity. The increase in the prevalence of chronic diseases among older European workers has a potentially negative influence on labour participation and can contribute to economic losses, both for society as a whole and for individuals [1–3]. Workers with a chronic disease are less likely to be involved in paid work, and when they are, they are confronted with limitations at work that potentially lead to sick leave, and they are more likely to leave the workforce before the official retirement age [4–6]. In OECD countries, the employment rate for people with chronic disease is 40 % below the general employment level [1].

We should be careful to consider the population of older workers as one homogeneous group because workers with a chronic disease form a large group within in the population of older workers. Older workers with chronic disease will suffer from different limitations at work compared to their colleagues without chronic disease, which may lead to different barriers to prolong work participation. According to the International Classification of Functioning (ICF), a decrease in participation in paid work is a consequence of loss of function (e.g., cardiac dysfunction) or a direct result of limitations in activities (e.g., difficulties with walking). In addition, personal and external factors may act as mediators between health and participation outcomes [7]. Examples of personal characteristics are personality and coping style; social or physical environment are external factors. These personal and external factors may act as barriers or facilitators for having paid work for those with a chronic disease. It is, however, unknown if predictors for having paid work in workers with chronic diseases also apply to workers without chronic disease. This information is crucial for the development of interventions to maintain work participation in the large group of workers with chronic disease.

Most researchers focus on one particular chronic disease, or study the total working population without distinguishing between workers with and without chronic disease. The increase in workforce participation of older workers over the past years as a result of diminishing benefits related to early retirement can be attributed mainly to the group of workers in good health [8]. When predictors of having paid work are different between older workers with and without chronic diseases, this would be an indication that different mechanisms for having paid work may exist for workers with and without a chronic disease. For example, workers with a chronic disease may need adjustments in the working environment to reduce limitations at work due to the disease and prolong work participation. On the other hand, both in older workers with and without chronic disease, better perceived health may be associated with prolonged work participation. Policies to promote a higher age of retirement are often directed to the general population of older workers, while most profits may be gained among older workers with chronic diseases.

The aim of this study was to gain insight into differences and similarities between predictors of having paid work of older workers with and without chronic diseases.

Methods

Sample

The study sample originated from the Longitudinal Aging Study Amsterdam (LASA), an ongoing multidisciplinary cohort study focusing on predictors and consequences of changes in well-being and autonomy in the older population. In 2002–2003, a sample of 1,002 respondents was recruited (aged 55–65 years; initial response rate 55 %) [9]. Details on the sampling and data collection procedures have been described elsewhere [9]. The Medical Ethics Committee of the VU University Medical Center approved the LASA study; informed consent was obtained from all respondents.

Inclusion and Exclusion Criteria

All participants in the 2002–2003 observation period who had paid work and had valid data on work status at follow up were included. The cut-off of 1 h per week was chosen to make sure that all persons who were connected to paid work were selected for this study. Exclusion criteria were aged 65 years or over at the time of the follow-up interview in 2005–2006, as 65 was the official Dutch retirement age. Of 333 workers at baseline, follow-up data were available of 316 workers (95 %). No significant differences in baseline characteristics were observed between those lost to follow-up and those who completed the follow-up measurement in 2005–2006.

Measures

The *presence of chronic disease* was determined by explicitly asking respondents whether they currently or previously had any of the following chronic diseases or

disease events: chronic non-specific lung disease (asthma, chronic bronchitis, or pulmonary emphysema), cardiac disease, peripheral atherosclerosis, stroke, diabetes mellitus, arthritis (rheumatoid arthritis and osteoarthritis), cancer or any other chronic disease. When compared to records of the participants' general practitioners, the agreement between self-reports and medical records proved satisfactory [10].

Having paid work was defined as having paid work at follow-up (2005–2006). Since we expected the largest contrast between those involved in paid work and those who were not at all involved in paid work, we defined having paid work as working at least 1 h per week at follow-up.

Work exposure was measured by three variables: physical work demands, psychosocial work demands and psychosocial resources at work, in line with the Job-Demand-Resources model [11]. These work exposure data were derived from a job-exposure matrix, in which occupational classes of the Netherlands Standard Classification of Occupations 1992 (NSCO92) were categorized into the level of probability of exposure to work demands and resources using self-reported data from the Netherlands Working Conditions Survey (n = 18,937 workers from 41 occupational classes) [12]. If >50 % of workers within one occupational class reported high physical demands, psychosocial demands or resources, the jobs belonging to that occupational class were classified as having 'high probability of exposure' to physical demands, psychosocial demands or resources. Jobs belonging to an occupational class were classified as having 'moderate probability of exposure' if the proportion of respondents with high demands or resources was ≤50 %, but above the study sample-based total proportion reporting high demands or resources, which was considered as the normative [12].

Physical work demands were categorized into: (1) a high probability of exposure to moderate to high physical demands (use of force, uncomfortable work or exposure to repetitive movements) compared to (0) a low probability of exposure to moderate to high physical demands.

Psychosocial work demands were categorized into: (1) a moderate to high probability of exposure to moderate psychosocial demands (task requirements, time pressure or cognitive demands) compared to (0) a low probability of exposure to moderate psychosocial demands.

Psychosocial resources at work were categorized into: (1) a high probability of low resources (low autonomy, low task variation, low supervisor support or low coworker support) compared to (0) a low probability of low resources.

To enhance readability of this paper, these three variables will be referred to as physical demands (high/low); psychosocial demands (high/low) and psychosocial resources (high/low).

Other work-related predictors were number of hours respondents worked per week, occupational prestige and occupational skill level. Occupational prestige was determined by assigning a prestige scale (0: low–100: high) developed by Sixma and Ultee (1984) to the job. Occupational skill level was determined based on the Netherlands Standard Classification of Occupations 1992 (NSCO92) and coded from 1 (elementary) to 5 (scientific).

Socio-demographic variables included were gender, age, highest level of education completed, having a partner (yes/no), having a partner with paid work (yes/no), satisfaction with income level, and satisfaction with living standard.

Self-rated health was assessed using the question: "How is your health in general?" Response categories were: (1) very good, (2) good, (3) fair, (4) sometimes good, sometimes poor, and (5) poor [13].

Depressive symptoms were investigated using the Center for Epidemiological Studies Depression scale (CES-D). This questionnaire has been shown to have good criterion validity [14–16].

Functional limitations were assessed using six self-report items pertaining to mobility activities in daily life. The questions were derived from the OECD questionnaire [17], which was translated to Dutch and validated by Statistics Netherlands [18, 19]. This scale was dichotomized into none or any functional limitations.

Mastery was measured using the Pearlin Mastery Scale [20], which consists of five items, with categories ranging from 1 = strongly agree to 5 = strongly disagree. The score ranges from 5 to 25, such that a higher rating indicates more feelings of mastery. Mastery is defined as "the extent to which a person perceives himself or herself to be in control of events and ongoing situations". A higher feeling of control in patients with a chronic disease was shown to be associated with better psychosocial adjustment to the disease [21].

Self-esteem was measured using an adapted version of Rosenberg self-esteem scale [22], consisting of four items, with categories ranging from 1 (strongly agree) to 5 (strongly disagree). A higher total score (range 4–20) indicates higher self-esteem.

Neuroticism and *Social inadequacy* were measured using a 15-item neuroticism scale and a 10-item and social inadequacy scale derived from the Dutch Personality Questionnaire (DPQ) [23, 24]. The selection of questions was based on pilot studies [25].

Analyses

To examine similarities and differences, descriptive analyses were performed for each of the potential predictors separately for the group with and without chronic disease by *t* tests and Chi square tests. The homogeneity of each

predictor for having paid work at follow-up across the groups with and without chronic disease was assessed using the approach proposed by Dyer as follows [26, 27]:

a. For each potential predictor a logistic regression model was fitted with having paid work in 2005–2006 as dependent variable, separately for the group with and without chronic disease;
b. A pooled estimate was computed by weighing both coefficients. Weighing was performed by dividing each coefficient by its variance, and then summing over the weighed coefficients. The pooled estimate was then calculated by dividing the sum of the weighed coefficients by the sum of the inverse of the variance of both coefficients;
c. The pooled estimate was used in a Chi square-test for coefficients to verify the null hypothesis that the coefficients in both groups were equal and did not significantly differ from the pooled estimate (i.e., whether the predictor was homogeneously distributed across groups) ($\chi^2 < 3.84$; DF = 1);
d. If the hypothesis of homogeneity was not rejected, the pooled estimate from (b) was examined and the significance of its association with the outcome was tested using a *t* test [26].
e. If the hypothesis of homogeneity was rejected, the coefficients in each group stratum were presented.

Results

Descriptive Findings

From the total study sample of 333 workers, 196 (59 %) workers reported to have at least one chronic disease. The most prevalent diseases were osteoarthritis (n = 71), cardiovascular disease (n = 45) and chronic, non-specific lung disease (n = 25). From the group with chronic disease, 79 % reported two or more chronic diseases. Female workers reported a higher prevalence of chronic diseases compared to male workers (Table 1). Workers with a chronic disease less often had a partner, reported to be less satisfied with their income level and worked fewer hours per week. The group of workers with a chronic disease reported to perform a job with a lower prestige and skill level, and more often high physical demands compared to workers without chronic disease.

In addition, workers with a chronic disease reported a lower self-rated health and more often had functional limitations than workers without a chronic disease. Workers with a chronic disease scored higher on depressive symptoms and neuroticism, lower on mastery, and lower on self-esteem than workers without a chronic disease. At follow-up, 67 % was involved in paid work. No differences in paid work were observed between the group with and without chronic disease.

Comparisons of Predictors of Work Status Between Workers with and Without a Chronic Disease

Two predictors for having paid work appeared to be heterogeneous ($\chi^2 > 3.84$; DF = 1), which implies that the groups of workers with and without chronic disease should be analyzed separately for the predictors psychosocial resources and physical demands at work (Table 2). Subgroup analyses revealed that within the group of workers with chronic disease, low psychosocial resources were predictive for not having paid work at follow up, whereas within the subgroup of workers without chronic disease, psychosocial resources were not significantly associated with paid work at follow-up (Table 3). For the second heterogeneous predictor, physical demands, subgroup analyses revealed that physical demands were not significantly associated with paid work in any group. However, in the group of workers with chronic disease, lower physical demands showed a tendency towards significance as predictor of having paid work at follow up ($p = 0.06$) (Table 3).

The remaining predictors for having paid work were found to be homogeneous ($\chi^2 < 3.84$), implying that these predictors for having paid work were not different for the groups of workers with and without chronic disease. When considering all workers, with and without chronic disease, younger age, working more hours per week, fewer depressive symptoms, no functional limitations, lower scores on neuroticism, and higher scores on mastery were predictive for having paid work at follow-up in 2005–2006.

Discussion

This study showed that workers with and without chronic disease should be considered as different groups with regards to a limited number of predictors of having paid work. Although most predictors for having paid work were found to be similar for workers with and without chronic disease, physical work demands and psychosocial resources at work turned out to have different predictive values among workers with and without a chronic disease. Low availability of psychosocial resources was a predictor for not having paid work in the group of workers with chronic disease and not in the group of workers without chronic disease.

Differences and Similarities Between Workers with and Without Chronic Disease

Within the context of predictors of work participation, older workers can be considered as one group, regardless of

Table 1 Descriptive characteristics of the workers with and without chronic diseases, and the total population; data expressed as mean (standard deviation) unless stated otherwise

Characteristics		No chronic disease	Chronic disease	Total
Baseline (2002–2003)	Categories	n = 137	n = 196	n = 333
Gender	Male (%)	**68.6 %**	**51.5 %**	58.6 %
Age	Years	57.8 (2.0)	57.9 (2.0)	57.9 (2.0)
Education level	Elementary not completed	2.2 %	2.6 %	2.4 %
	Elementary education	10.9 %	11.2 %	11.1 %
	Lower vocational	17.5 %	21.9 %	20.1 %
	General intermediate	13.1 %	16.3 %	15.0 %
	Intermediate vocational	15.3 %	18.4 %	17.1 %
	General secondary	3.6 %	2.6 %	3.0 %
	Higher vocational	24.1 %	18.9 %	21.0 %
	College	1.5 %	1.5 %	1.5 %
	University	11.7 %	6.6 %	8.7 %
Partner	Yes (%)	**91.2 %**	**81.6 %**	85.6 %
Partner paid work	Yes (%)	58.3 %	58.6 %	58.5 %
Satisfaction income level	1 (dissatisfied)–5	**4.7 (0.7)**	**4.3 (1.2)**	4.5 (1.1)
Satisfaction living standard	1 (dissatisfied)–5	4.7 (0.8)	4.5 (0.9)	4.6 (0.9)
Hours of work per week	Hours/week	**33.9 (14.6)**	**29.2 (16.7)**	31.1 (16.0)
Occupational prestige level	13 (low)–83 (high)	**44.5 (15.4)**	**39.7 (15.4)**	41.7 (15.5)
Occupational skills level	1 elementary–5 scientific	**3.1 (1.0)**	**2.9 (1.0)**	3.0 (1.0)
Physical work demands	Moderate to high	**63.6 %**	**73.3 %**	69.4 %
Psychological work demands	Moderate to high	38.0 %	32.7 %	34.8 %
Psychosocial resources	Low	76.6 %	81.6 %	79.6 %
Self-rated health	1 very good–5 poor	**1.7 (0.6)**	**2.4 (0.8)**	2.1 (0.8)
Comorbidity	More than 1 disease	0.0 %	79.1 %	46.5 %
Functional limitations	None (%)	**94.2 %**	**77.6 %**	84.4 %
CES—D score	0 (low)–60 (high)	**5.0 (5.0)**	**7.2 (6.3)**	6.3 (5.9)
Neuroticism	0 (low)–30 (high)	**3.2 (3.5)**	**5.0 (4.5)**	4.3 (4.2)
Social inadequacy	0 (low)–20 (high)	**3.9 (4.1)**	**4.7 (4.3)**	4.4 (3.9)
Mastery	5 (low)–25 (high)	**19.6 (3.1)**	**18.6 (3.0)**	19.0 (3.1)
Self-esteem	4 (low)–20 (high)	**16.2 (1.8)**	**15.6 (2.1)**	15.8 (2.1)
Follow-up		n = 131	n = 185	n = 316
Paid work (2005–2006)	Yes (%)	67.2 %	65.9 %	66.5 %

Bold values: $p < 0.05$ between groups with and without chronic disease

the presence of chronic disease. However, the predictors physical work demands and psychosocial resources showed different associations with having paid work in the groups with and without chronic diseases. As research on having paid work at advanced adult age is sparse, we will compare our finding with research conducted on predictors of early retirement. It should however be kept in mind that in our study, early retirement is only one of the reasons for not working, in addition to work disability or unemployment. The relation between having high physical work demands at baseline and having paid work at follow-up was found to be significantly different between the groups of workers with and without chronic disease. Previous studies on workers in general have shown that high physical workload was associated with early retirement [28, 29]. In a study in workers suffering from various chronic diseases, physical workload was associated with exit from the workforce because of work disability [30]. In these studies differences between workers with and without chronic disease were not examined. Our results indicate that the subgroup with chronic disease is responsible for this association, rather than the total population of workers. More research is needed, using larger samples of workers with and without chronic disease, to confirm our results.

The workers in our study with low psychosocial resources at work were less likely to be involved in paid work 3 years later, but only if they had a chronic disease. In a recent study using European data, it was shown that

Table 2 Pooled estimates. Chi square tests for homogeneity for all multivariate coefficients; Odds ratios including 95 % confidence intervals for the association with the outcome: having paid work in 2005–2006

Socio-demographic variables	Pooled estimate B	Chi square test limit: 3.84	Odds ratio	95 % CI limits lower–upper
Gender	0.05	3.56	1.05	0.64–1.73
Age	−0.28	1.40	**0.76**	**0.67–0.86**
Education	0.05	0.00	1.05	0.94–1.17
Partner	−0.23	1.07	0.79	0.39–1.62
Financial economic variables				
Hours work per week	0.02	0.47	**1.02**	**1.00–1.03**
Partner with paid work	0.50	0.73	1.66	0.98–2.79
Satisfaction income	0.07	0.60	1.07	0.86–1.34
Satisfaction living standard	0.17	0.83	1.18	0.91–1.53
Work-related variables				
Occupational skills	0.21	0.42	1.23	0.96–1.58
Occupational prestige level	0.01	0.64	1.01	1.00–1.03
Physical work demands	−0.10	**5.37**	Subgroup analyses in Table 3	
Psychosocial work demands	−0.32	0.04	0.73	0.45–1.18
Psychosocial resources at work	−0.33	**5.94**	Subgroup analyses in Table 3	
Health				
Self-rated health	−0.24	0.66	0.79	0.57–1.08
Depression score	−0.05	1.05	**0.95**	**0.91–0.99**
Functional limitations	−0.80	0.00	**0.45**	**0.24–0.85**
Personality				
Neuroticism	−0.08	0.58	**0.92**	**0.87–0.98**
Social inadequacy	−0.05	0.21	0.95	0.90–1.00
Mastery	0.10	0.06	**1.11**	**1.02–1.20**
Self-esteem	0.11	1.57	1.12	0.99–1.27

Bold values: $p < 0.05$

Table 3 Results of non-homogeneous predictors of having paid work in 2005–2006

Predictor	No chronic disease	Chronic disease
	OR (95 % CI)	OR (95 % CI)
High physical demands	1.80 (0.81–4.02)	0.48 (0.22–1.04)
Low psychosocial resources at work	1.41 (0.61–3.25)	**0.28 (0.10–0.75)**

OR Odds ratio, 95 % *CI* 95 % Confidence interval; Bold values: $p < 0.05$

lack of job control, an aspect of psychosocial resources, was a risk factor for exit from work [31]. Again, no distinction was made between those with and without chronic disease, but our results indicate that the workers with chronic disease may be responsible for this association. Leinonen and colleagues showed that job control was associated with early exit from the workforce because of work disability in workers with mental disorders [30].

Our findings that physical work demands and psychosocial resources play a role in having paid work in workers with chronic disease only can be interpreted in the context of the Job-Demand-Resources model, which proposes a need to balance job demands and resources [11]. This balance has been investigated previously. Job strain occurs if demands are high and resources are low. It has been shown that high job strain was predictive for disability pension in a population of Finnish public sector employees and for early retirement intention in a population of Danish employees in elderly care [32, 33]. We hypothesize that the subgroup of workers with chronic disease is responsible for the associations found between job strain and early exit from work. This is supported by a recent qualitative study in older workers, where it was concluded that the influence of health on productivity depends on the balance between demands and resources [34]. In this sense, our results suggest that having a chronic disease may trigger the imbalance between demands and resources.

Predictors for Having Paid Work in Older Workers

Most of the predictors we investigated were similar for workers with and without chronic disease. The predictors we found are generally in line with previous research. Younger age was a predictor of having paid work, which is in line with previous findings in studies on (early) retirement [29, 35]. Working more hours per week at baseline was associated with having paid work at follow-up as well. As working more hours per week is generally associated with higher income, this finding is in line with earlier studies showing associations between a low income level and (early) retirement [35, 36]. Workers without functional limitations were more likely to prolong work participation as well, which has been reported previously by Szubert and Sobala [37].

Our finding that lower scores on depression and neuroticism were predictive for having paid work is in line with studies showing that depressive symptoms or depression were predictive for (early) retirement or disability pension [38, 39]. It has been shown that neuroticism may be a precursor of depression [40].

More mastery was predictive for having paid work. Previous research has shown that workers' feelings of mastery increase with levels of job control [41]. Although there are no studies on mastery and having paid work or early retirement, a number of studies have shown that low job control or autonomy in work are associated with (early) retirement [29, 35, 36].

Surprisingly, self-rated health was not a predictor of having paid work in our population. This is in contrast to earlier studies, which showed that poor health was associated with early retirement or work disability [42–45]. One explanation for the contrast between our findings and the literature may be a selection effect of our population of workers aged 55–62 years. Our study population was older compared to studies where health was a predictor of exit from work. These studies included workers aged from 40 years [45], 42 years [44], or 51 years [46]. This implies that our population likely represents a group who successfully managed to stay at work until the age of 55–62 years. The workers with long-standing poor health are more likely to have left the workforce at a younger age [47], therewith decreasing the variance of self-rated health in our population. Another explanation may be that in addition to poor health, good health may be a predictor to retire as well. In a recent qualitative study, workers reported that they wanted to enjoy life and quit working as long as their health allowed them to [48].

The way workers value their participation in paid work may be different between workers with and without chronic diseases, and may differ between different chronic diseases. In a previous study it was shown that workers with a chronic pulmonary disease were eager to continue their participation in paid work [49]. This may be an explanation for the high prevalence of chronic disease in our sample of workers which should be investigated in future studies.

Methodological Considerations

The major strength of this study is that it relied on data from the Longitudinal Aging Study Amsterdam (LASA), which is a representative sample of older adults between the ages of 55 and 85 years in the Netherlands [9]. As a result of the selection of the population in the working age, a small group was available for analysis. Therefore, it was not possible to correct for confounders in any of the analyses. However, because this is the first study to undertake these analyses, the results can be considered as a first necessary step towards understanding predictors of having paid work in workers with and without chronic disease.

The choice of predictors to include in this study depended on the availability of the variables in the LASA cohort. The aim of the LASA cohort was to determine predictors and consequences of ageing in general [9]. However, detailed information about working arrangements, such as for example job control opportunities, social support from supervisors or colleagues, was not included in the questionnaire. We estimated the likelihood of having a job with certain characteristics (physical demands, psychosocial demands, psychosocial resources) based on occupations of participants through a job-exposure matrix [12]. Thus, the variables on physical and psychosocial job demands and resources reflect a high likelihood to be involved in a job with e.g., high physical demands, rather than a direct report of a participant about high physical demands.

Because this study has been carried out within the Dutch social welfare context, caution is needed before the results can be translated to countries with a different social welfare system. The largest contrasts can be found within the work disability benefits. Until 2004, in the Netherlands, the employer was responsible for the employee's salary during the first year of sick leave. This is in contrast with e.g., the United States or Canada, where the employee only receives work disability benefits if the reason for work disability is work-related.

The data presented here were collected 6–10 years ago. Since then the pressure for employers as well as employees has increased to remain active in the workforce. This has led to re-examination of workers who received work disability benefits and termination of early retirement arrangements. Work participation among older workers has increased in recent years, and the average retirement age has risen.

Differences exist between reasons for not being involved in paid work at follow-up. In this study, we were interested in predictors of having paid work, rather than predictors of one of the reasons for not working, such as e.g., early retirement or work disability. Unfortunately, due to power constraints, we could in our analyses not differentiate between causes of not having paid work. However, predictors for having paid work are not necessarily the inverse of predictors for early retirement, as there are more reasons to leave the workforce. Therefore, we have chosen to focus on having paid work, which is considered to be the ultimate aim of current policy measures. Future research on larger samples should take into account differences between reasons for exit from paid work, although this is often a multifactorial process. This was demonstrated in a recent qualitative study in which was shown that an interplay between factors that pushed towards early retirement (e.g., conflicts at work), and factors that attracted towards early retirement (e.g., wish to enjoy life) led to early retirement of older workers [50].

Implications for Research and Practice

The most important implication of this study is that differences between workers with and without chronic disease may exist and should be taken into account in research and practice. Whether physical demands and low psychosocial resources are crucial factors in determining dropout from the workforce needs to be explored in future studies. Previous studies have shown that exit from paid work is a process involving multiple predictors. Still, the current findings give rise to new ways of thinking about how to support the increasing group of older workers to prolong their working life as older workers with and without chronic disease may need different types of interventions.

The group of workers with chronic disease requires specific attention if they have jobs with high physical demands or jobs with low resources as they may have a lower likelihood to keep on working in a paid job. Work adjustments such as increasing psychosocial work resources may be implemented to improve working conditions and reduce sick leave, as was demonstrated in a previous study [51]. In that study, it was shown that sick leave decreased in workers with chronic disease following the implementation of work adjustments. These work adjustments included adjustments in the environment (ergonomics) as well as organization of work (taking breaks, adjustments of working hours) [51]. A direction of future research might be to explore the effects of work adjustments on prolonged work participation.

Within the total group of older workers, those with depressive symptoms, functional limitations, higher neuroticism scores and lower mastery scores require specific attention, as these workers had a smaller chance to have paid work at follow-up. Future research should focus on larger datasets that would enable correction for confounders and to gain insight in the relative contribution of the different predictors to explaining participation in paid work. Also, it remains to be seen whether the relevance of predictors differs between different types of chronic diseases. Therefore, another direction for future research would be to explore differences between predictors of participation in paid work between different chronic diseases. Finally, for future research it would be valuable to explore if the heterogeneity found for physical work load and psychosocial resources are independent, or if the heterogeneity found for both predictors involves a common concept.

Conclusion

The present study confirmed that younger age, more working hours, absence of functional limitations, less neuroticism, higher sense of mastery and fewer depressive symptoms were predictive for having paid work until 3 years follow-up, when our sample reached the age of 58–65 years.

Most predictors of having paid work were similar for older workers with or without chronic diseases, but the role of physical work demands and psychosocial resources in participation in paid work differed between workers with and without chronic disease.

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References

1. Harbers MM, Achterberg PW. Europeans of retirement age: chronic diseases and economic activity. Bilthoven: RIVM; 2012.
2. Bhattacharya J, Choudhry K, Lakdawalla D. Chronic disease and severe disability among working-age populations. Med Care. 2008;46:92–100.
3. Blokstra A, Baan CA, Boshuizen HC, Feenstra TL, Hoogenveen RT, Picavet HS, et al. Impact of the ageing population on burden of disease: projections of chronic disease prevalence for 2005–2025. Bilthoven: National Institute for Public Health and Environment; 2007.
4. Baanders AN, Rijken PM, Peters L. Labour participation of the chronically ill: a profile sketch. Eur J Public Health. 2002;12:124–30.
5. Boot CR, Koppes LL, van den Bossche SN, Anema JR, van der Beek AJ. Relation between perceived health and sick leave in employees with a chronic illness. J Occup Rehabil. 2011;21:211–9.
6. Li RT, d'Errico A, Costa G. Association between chronic morbidity and early retirement in Italy. Int Arch Occup Environ Health. 2013;86:295–303.

7. World Health Organization. International classification of functioning, disability and health: ICF. Geneva: WHO; 2001.
8. Garcia-Gomez P, von Gaudecker HM, Lindeboom M. Health, disability and work: patterns for the working age population. Int Tax Public Financ. 2011;18:146–65.
9. Huisman M, Poppelaars J, van der Horst M, Beekman AT, Brug J, van Tilburg TG, et al. Cohort profile: the longitudinal aging study Amsterdam. Int J Epidemiol. 2011;40:868–76.
10. Kriegsman DM, Penninx BW, van Eijk JT, Boeke AJ, Deeg DJ. Self-reports and general practitioner information on the presence of chronic diseases in community dwelling elderly. A study on the accuracy of patients' self-reports and on determinants of inaccuracy. J Clin Epidemiol. 1996;49:1407–17.
11. Bakker AB, Demerouti E. The job demands-resources model: state of the art. J Manag Psychol. 2007;22:309–28.
12. Rijs KJ, Van der Pas S, Geuskens GA, Cozijnsen R, Koppes LL, van der Beek AJ, et al. Development and validation of a physical and psychosocial job-exposure matrix in older and retired workers. Ann Occup Hyg. 2013. doi:10.1093/annhyg/met052.
13. Van Sonsbeek JLA. Het eigen oordeel over de gezondheid; methodische effecten bij het gezondheidsoordeel in gezondheidsenquetes [The self-rating of health: methodological effects of the rating of health in health interview surveys]. Maandbericht Gezondheid. 1991;10:15–23.
14. Beekman AT, Deeg DJ, Van LJ, Braam AW, De Vries MZ, Van TW. Criterion validity of the Center for Epidemiologic Studies Depression scale (CES-D): results from a community-based sample of older subjects in The Netherlands. Psychol Med. 1997;27:231–5.
15. Radloff LS. The CES-D Scale: a self-report depression scale for research in the general population. J Appl Psychol Meas. 1977;1:385–401.
16. Radloff LS. Use of Center for Epidemiological Studies-Depression Scale with older adults. Clinical Gerontol. 1986;5:119–36.
17. McWhinnie JR. Disability assessment in population surveys: results of the O.E.C.D. Common Development Effort. Rev Epidemiol Sante Publique. 1981;29:413–9.
18. Van Sonsbeek JLA. Methodological and substantial aspects of the OECD indicator of chronic functional limitations. Maandbericht Gezondheid. 1988;88:4–17.
19. Deeg DJ. Longitudinal characterization of course types of functional limitations. Disabil Rehabil. 2005;27:253–61.
20. Pearlin LI, Schooler C. The structure of coping. J Health Soc Behav. 1978;19:2–21.
21. Bisschop MI, Kriegsman DM, Beekman AT, Deeg DJ. Chronic diseases and depression: the modifying role of psychosocial resources. Soc Sci Med. 2004;59:721–33.
22. Rosenberg M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.
23. Steunenberg B, Twisk JW, Beekman AT, Deeg DJ, Kerkhof AJ. Stability and change of neuroticism in aging. J Gerontol B Psychol. 2005;60:27–33.
24. Luteijn F, Starren J, Van Dijk H. Handleiding bij de Nederlandse Persoonlijkheidsvragenlijst [Manual of the Dutch Personality Questionnaire]. Lisse: Swets & Zeitlinger; 1975.
25. Smits CH, Deeg DJ, Jonker C. Cognitive and emotional predictors of disablement in older adults. J Aging Health. 1997;9:204–21.
26. Dyer AR. A method for combining results from several prospective epidemiologic studies. Stat Med. 1986;5:303–17.
27. Noale M, Minicuci N, Bardage C, Gindin J, Nikula S, Pluijm S, et al. Predictors of mortality: an international comparison of socio-demographic and health characteristics from six longitudinal studies on aging: the CLESA project. Exp Gerontol. 2005;40:89–99.
28. Karpansalo M, Manninen P, Lakka TA, Kauhanen J, Rauramaa R, Salonen JT. Physical workload and risk of early retirement: prospective population-based study among middle-aged men. J Occup Environ Med. 2002;44:930–9.
29. Lund T, Villadsen E. Who retires early and why? Determinants of early retirement pension among Danish employees 57–62 years. Eur J Ageing. 2005;2:275–80.
30. Leinonen T, Pietilainen O, Laaksonen M, Rahkonen O, Lahelma E, Martikainen P. Occupational social class and disability retirement among municipal employees—the contribution of health behaviors and working conditions. Scand J Work Environ Health. 2011;37:464–72.
31. Robroek SJ, Schuring M, Croezen S, Stattin M, Burdorf A. Poor health, unhealthy behaviors, and unfavorable work characteristics influence pathways of exit from paid employment among older workers in Europe: a four year follow-up study. Scand J Work Environ Health. 2013;39:125–33.
32. Sejbaek CS, Nexo MA, Borg V. Work-related factors and early retirement intention: a study of the Danish eldercare sector. Eur J Public Health. 2013;23:611–16.
33. Laine S, Gimeno D, Virtanen M, Oksanen T, Vahtera J, Elovainio M, et al. Job strain as a predictor of disability pension: the Finnish Public Sector Study. J Epidemiol Community Health. 2009;63:24–30.
34. Leijten F, van den Heuvel S, Geuskens G, Ybema JF, de Wind A, Burdorf A, et al. How do older employees with health problems remain productive at work?: a qualitative study. J Occup Rehabil. 2013;23:115–24.
35. Blekesaune M, Solem PE. Working conditions and early retirement—a prospective study of retirement behavior. Res Aging. 2005;27:3–30.
36. Friis K, Ekholm O, Hundrup YA, Obel EB, Gronbaek M. Influence of health, lifestyle, working conditions, and sociodemography on early retirement among nurses: the Danish Nurse Cohort Study. Scand J Public Health. 2007;35:23–30.
37. Szubert Z, Sobala W. Current determinants of early retirement among blue collar workers in Poland. Int J Occup Med Environ Health. 2005;18:177–84.
38. Karpansalo M, Kauhanen J, Lakka TA, Manninen P, Kaplan GA, Salonen JT. Depression and early retirement: prospective population based study in middle aged men. J Epidemiol Community Health. 2005;59:70–4.
39. Rice NE, Lang IA, Henley W, Melzer D. Common health predictors of early retirement: findings from the english longitudinal study of ageing. Age Ageing. 2011;40:54–61.
40. Grav S, Stordal E, Romild UK, Hellzen O. The relationship among neuroticism, extraversion, and depression in the HUNT Study. In relation to age and gender. Issues Ment Health Nurs. 2012;33:777–85.
41. Bradley GL. Work-induced changes in feelings of mastery. J Psychol. 2010;144:97–119.
42. Boot CR, Heijmans M, van der Gulden JW, Rijken M. The role of illness perceptions in labor participation of the chronically ill. Int Arch Occup Environ Health. 2008;82:13–20.
43. Detaille SI, Heerkens YF, Engels JA, van der Gulden JW, van Dijk FJ. Common prognostic factors of work disability among employees with a chronic somatic disease: a systematic review of cohort studies. Scand J Work Environ Health. 2009;35:261–81.
44. Karpansalo M, Manninen P, Kauhanen J, Lakka TA, Salonen JT. Perceived health as a predictor of early retirement. Scand J Work Environ Health. 2004;30:287–92.
45. Elovainio M, Kivimaki M, Vahtera J, Ojanlatva A, Korkeila K, Suominen S, et al. Social support, early retirement, and a retirement preference: a study of 10,489 Finnish adults. J Occup Environ Med. 2003;45:433–9.

46. Kim H, DeVaney SA. The selection of partial or full retirement by older workers. J Fam Econ Issues. 2005;26:371–94.
47. Brockmann H, Muller R, Helmert U. Time to retire—time to die? A prospective cohort study of the effects of early retirement on long-term survival. Soc Sci Med. 2009;69:160–4.
48. de Wind A, Geuskens GA, Reeuwijk KG, Westerman MJ, Ybema JF, Burdorf A, et al. Pathways through which health influences early retirement: a qualitative study. BMC Public Health. 2013;13:292.
49. Boot CR, van Exel NJ, van der Gulden JW. "My lung disease won't go away, it's there to stay": profiles of adaptation to functional limitations in workers with asthma and COPD. J Occup Rehabil. 2009;19:284–92.
50. Reeuwijk KG, de Wind A, Westerman MJ, Ybema JF, van der Beek AJ, Geuskens GA. 'All those things together made me retire': qualitative study on early retirement among Dutch employees. BMC Public Health. 2013;13:516.
51. Boot CR, van den Heuvel SG, Bultmann U, de Boer AG, Koppes LL, van der Beek AJ. Work adjustments in a representative sample of employees with a chronic disease in the Netherlands. J Occup Rehabil. 2013;23:157–61.